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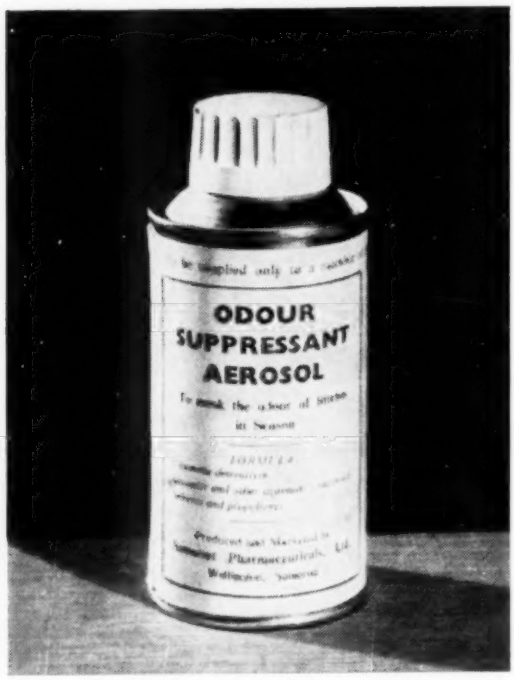

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Laparo-orchidectomy in the Horse with Abdominal Cryptorchidism

BY

J. G. WRIGHT

School of Veterinary Science, University of Liverpool

SUMMARY.—A series of 17 cryptorchid horses is described, in 8 of which the hidden testicle was retained in the abdominal cavity. In 6 of these the testicle was removed by suprapubic paramedian laparotomy. All the animals made an uninterrupted recovery.

The writer believes the operation is greatly superior, particularly in ponies, to the classical operation of Degive. Stress is laid on the necessity for ensuring by surgical exploration that the case is not one of inguinal retention before laparotomy is embarked upon.

Introduction

IN a previous communication (Wright, 1955), the writer reviewed a series of 36 cryptorchid horses dealt with by him and his colleagues at the Field Station of the Liverpool School. Of the 39 testicles involved (3 of the animals being bilateral cryptorchids), 21 (54 per cent.) were retained in the abdominal cavity and 18 (46 per cent.) were situated either in the inguinal canal or at the external inguinal ring, while the side incidence was equal. Five of the abdominal testes were abnormal; 3 being dermoids and 2 cystic and greatly enlarged. In this group, many of which were dealt with during or just after the war, cart colts predominated. For orchidectomy in the abdominal cases, the classical operation associated with the names of Miles of America, Degive (1908) of Belgium and Hobday (1903) of this country, was adopted. This comprised perforation of the peritoneum at the internal inguinal ring with a finger or finger-knife and a search made for the testicle in the abdominal cavity adjacent to the ring, at first with two fingers only and if that failed, the whole hand.

Of the 21 abdominal cases dealt with in this manner, 14 (66 per cent.) were completely successful; in 2 recovered cases the abdominal testicle was not found, while 5 (24 per cent.) died or were destroyed. Of these, 4 were destroyed consequent upon prolapse of small intestine through the aperture made in the abdominal wall at the internal inguinal ring.

The writer has long been dissatisfied with the Degive operation because of the uncontrollable risk of prolapse it entails. His experience of cart colts was that provided he was able to find and withdraw the testicle with the insertion of two fingers only into the abdomen, the risk of subsequent prolapse was negligible but when, in order to find the organ, it was necessary to force the whole hand through the internal ring, the risk was grave. In ponies, the degree of breakdown necessary to insert only two fingers could be associated with prolapse.

Fundamentally, the making of any significant aperture in the abdominal wall which cannot be closed, is bad surgery and the tears at the inguinal ring which the classical operation involves are impossible of certain closure. Thus it was decided to adopt the laparotomy approach.

Cases Under Review

Since that time an additional 17 cases have been dealt with. From Table I, it will be seen that in this group, 8 (47 per cent.) were retained in the abdomen and that left-sided retention was the more common. In none was the testis abnormal. In this group, dealt with after the virtual disappearance of cart horses, cryptorchidism was most often met in ponies the majority of which were Welsh. In 6 of them suprapubic paramedian laparotomy was performed.

Prior to embarking on laparotomy it was necessary to ensure that the case was not one of inguinal retention. When the testicle was situated at the external inguinal ring it was generally possible to palpate it either with the horse standing or, in a difficult individual, after it had been cast and anaesthetised. But in true inguinal cases, it was impossible to detect the testicle from the exterior and a careful surgical exploration of the canal was necessary before concluding the case was an abdominal one. From Table I, it will be seen that of the 9 inguinal cases, in 3 only had the testicle descended to a point which permitted its detection at the external ring. Incidentally, the "hidden" testicle which had passed through the canal was generally larger than the one situated in the canal itself. Not infrequently,

TABLE I
CRYPTORCHID ORCHIDECTOMY IN THE HORSE

Case number	Age and type	Side involved	Position of hidden testicle	Type of opinion adopted	Remarks
1. (3978)	1-year-old pony	R	Inguinal canal	Orthodox	—
2. (4120)	5 ,, ,, pony	L	Abdomen	Laparotomy	Normal testicle previously removed
3. (4164)	2 ,, ,, cart	R	Abdomen	Degive	—
4. (4208)	2 ,, ,, Thoroughbred	L	Inguinal canal	Orthodox	—
5. (4547)	3 ,, ,, pony	L	Abdomen	Laparotomy	Normal testicle previously removed
6. (4556)	2 ,, ,, Thoroughbred	L	Inguinal canal	Orthodox	—
7. (4588)	3 ,, ,, Thoroughbred	L	Abdomen	Laparotomy	—
8. (4652)	2 ,, ,, pony	L	Ext. inguinal ring	Orthodox	—
9. (4889)	2 ,, ,, pony	L	Abdomen	Laparotomy	Normal testicle previously removed
10. (4910)	3 ,, ,, hunter	L	Inguinal canal	Orthodox	—
11. (5046)	2 ,, ,, pony	R	Ext. inguinal ring	Orthodox	—
12. (5140)	1 ,, ,, pony	R	Partial abdominal	Degive	Epididymis in canal
13. (5502)	2 ,, ,, Thoroughbred	L	Inguinal canal	Orthodox	—
14. (5541)	3 ,, ,, pony	R	Ext. inguinal ring	Orthodox	—
15. (5625)	3 ,, ,, trotter	L	Inguinal canal	Orthodox	—
16. (5868)	5 ,, ,, pony	L	Abdomen	Laparotomy	Normal testicle previously removed
17. (5890)	3 ,, ,, pony	L	Abdomen	Laparotomy	Normal testicle previously removed

in fact in 5 cases of the group under consideration, the testicle which had descended normally had been removed before the animal was purchased and it was only its male behaviour-pattern which brought it under suspicion. In these the side of retention was sometimes a problem. The exact position and significance of scars was difficult to determine. In these cases, the procedure was to search each canal surgically for the presence of a spermatic cord and having found what was thought to be one, to remove a little of it to demonstrate the vas deferens, cremaster muscle and tunica vaginalis. While, on superficial thought, this might seem to be easy, in many ponies the great fat deposition in the inguinal region made detection of the cord difficult and a most careful exploration was necessary before concluding it was absent.

As to the value of rectal examination in the diagnosis of abdominal cryptorchidism, the writer found it to be negligible. The small, flabby organ did not allow of accurate digital detection through the rectal wall and confusion might have become the more confounded.

Technical Considerations

The first consideration was the optimum site for incision of the abdominal wall. This clearly should be as near as possible to the position of the retained testicle so as to allow the organ to be drawn through the incision and its removal by emasculator outside the abdomen, yet not so close to the inguinal ring as to render subsequent closure exceptionally difficult. It was known from previous experience that the commonest site of retention was close to the internal inguinal ring (Fig. 1, C). It was also known that the flexibility of the peritoneal fold carrying the vas deferens and the spermatic vessels allowed it to be pulled a distance of some 5 or 6 inches from this site. It was thus decided to incise the abdominal wall along a line extending from a little posterior to a little anterior to the preputial orifice and some 2½ inches lateral to the penial elevation on the appropriate side (Fig. 1). As to the length of the incision, it should be just sufficiently long to allow the easy introduction of the hand into the abdomen, *i.e.*, 4 to 5 inches.

The next consideration was that of restraint. To give a clear field for operation it would be necessary to have the animal fixed in dorsal recumbency with the hind limb on the side of operation released from the hobbles or sidelines and drawn well back in posterior extension (Fig. 2). General anaesthesia would need to be deep to give adequate abdominal relaxation and to overcome any tendency to reflex straining in response to manipulation of viscera. It was decided that intravenous chloral hydrate should be the induction anaesthetic and that for

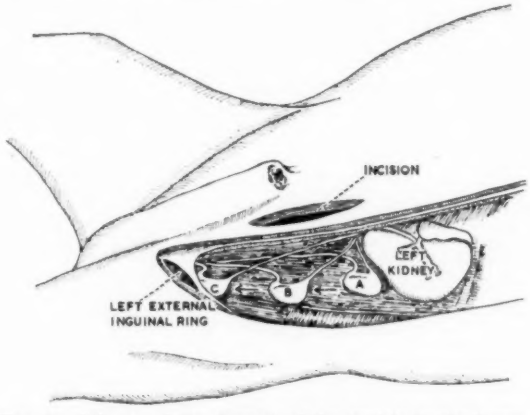

FIG. 1.—Scheme of the descent of the testicle in the horse. A, B, and C: sites at which the retained testicle may be found.

deepening and maintenance when required, intravenous pentobarbitone sodium should be used. In order that there should be no movement during the final stages of operation—skin suturing—by which time the general anaesthesia might well be lightening, local infiltration of the line of incision should be adopted.

Acknowledgments.—The writer would gratefully acknowledge the help he has received from his clinical colleagues, Messrs. P. J. N. Pinsent, P. A. Neal and H. E. Ritchie, who have worked with him as a surgical team at the Field Station. He is also indebted to Mr. J. W. Dransfield of the Department of Veterinary Anatomy for the line drawing illustrating the descent of the testicle and to Messrs. Baillière, Tindall and Cox, for allowing him to use two photographs which appear in Wright's *Veterinary Anaesthesia* published by them.

TABLE II
LAPARO-ORCHIDECTOMY IN THE HORSE—ANAESTHESIA

Case number	Age and type	Weight kg.	Induction anaesthetic	Deepening and/or maintenance anaesthetic	Total recumbency time hours
2. (4120)	5-year-old pony	254	Chloral Hydr. 35 g.	Pentobarb. Sod. 1·1 g.	2½
5. (4547)	3 ,, ,, pony	210	,, ,, 27 g.	None required	2
7. (4588)	3 ,, ,, Thoroughbred	484	,, ,, 65 g.	Pentobarb. Sod. 1·1 g.	2¼
9. (4889)	2 ,, ,, pony	234	,, ,, 32 g.	None required	2½
16. (5868)	5 ,, ,, pony	223	,, ,, 30 g.	Pentobarb. Sod. 1·8 g.	2½
17. (5890)	3 ,, ,, pony	220	,, ,, 30 g.	None required	2

Operative Experiences and Results

Six horses have been successfully dealt with in this way. In 2, the inguinal operation and the laparotomy were performed at the same time, while in the remainder a period of 6 to 8 weeks was allowed to elapse between the two. In all cases healing of the laparotomy wound was by primary union and there was no post-operative malaise. Some oedema of the abdominal wall along the course of the posterior abdominal vessels commenced on the third day after operation but this had subsided by the 10th.

The only feature of incision of the abdominal wall requiring comment was the considerable quantity of retroperitoneal fat present. This was of a thickness of 1 to 1½ inches. Its presence tended to make precise cutting of the peritoneum beneath awkward. In 5 of the cases the testicle was quickly found at site C, Fig. 1, while in the other (case 7) it was at site B. Here its detection was more difficult because of the superimposed viscera. In all cases no difficulty was experienced in drawing the testicle into the wound aperture for removal. The abdominal wall was closed in two layers. The deeper sutures included the abdominal tunic, rectus muscle, retroperitoneal fat and peritoneum ; they were of double strand No. 4 catgut, interrupted and placed about ¾ inch apart. Care was necessary to ensure that the peritoneum on both sides of the wound was included. There was a tendency for it to be drawn away from the muscle and fat. The superficial sutures, which were of braided nylon and of the mattress type, included the skin and subcutaneous fascia. Antibacterial treatment was as follows : 5 mega units of procaine penicillin dissolved in 30 ml. of water were introduced into the peritoneal cavity. The incision layers, particularly the muscle, were freely treated with penicillin cerate and dusted with sulphanilamide. Daily doses of 5 mega units of penicillin were given parenterally for the first 3 days post-operation. Skin sutures were removed on the 8th day.

FIG. 2.—Case 7. The horse cast and anaesthetised. Exposure of the operation site.

FIG. 3.—Case 7. Withdrawal of the testicle through the laparotomy incision.

(*Concluded overleaf*)

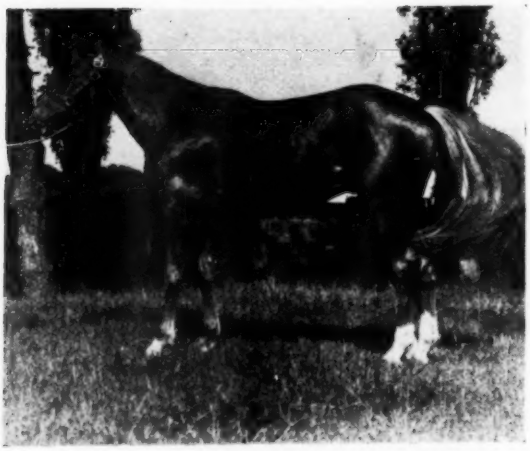

FIG. 4.—Case 7. The animal 8 days after operation.

FIG. 5.—Case 9. The wound four days after operation.

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Combined Corticosteroid and Antibiotic Therapy in Swine Agalactia

BY

W. A. NOBLE, A. A. MARSHALL and G. OAKLEY

March, Cambs.

SUMMARY.—The theoretical application of corticosteroid therapy to agalactia in sows is presented.

Two main types of infective agalactia are discussed with typical case histories.

The value of this type of therapy is based upon early return to lactation and reduction in litter mortality.

IN his paper to the British Veterinary Congress at Cambridge (1957) on Physiological Foundations of Milk Production and Lactational Disorders, Dr. B. A. Cross discussed, hypothetically, the causes of agalactic symptoms in swine. This was followed by a selection of possible causes of milk ejection failure.

As this present report deals with cases of agalactia which have received combined corticosteroid therapy it is interesting to note that Dr. Cross drew attention to emotional stress and tissue inflammation due to pathogenic organisms. It is also interesting to note the remarks on the undesirability of vasopressin in pituitrin and the recommendation of purified oxytocic extract (pitocin).

It was because of this somewhat original evaluation and discussion of causation and treatment that we decided to initiate corticosteroid therapy in addition to the usual antibiotic therapy, and in place of pituitrin, which had proved ineffective in many instances.

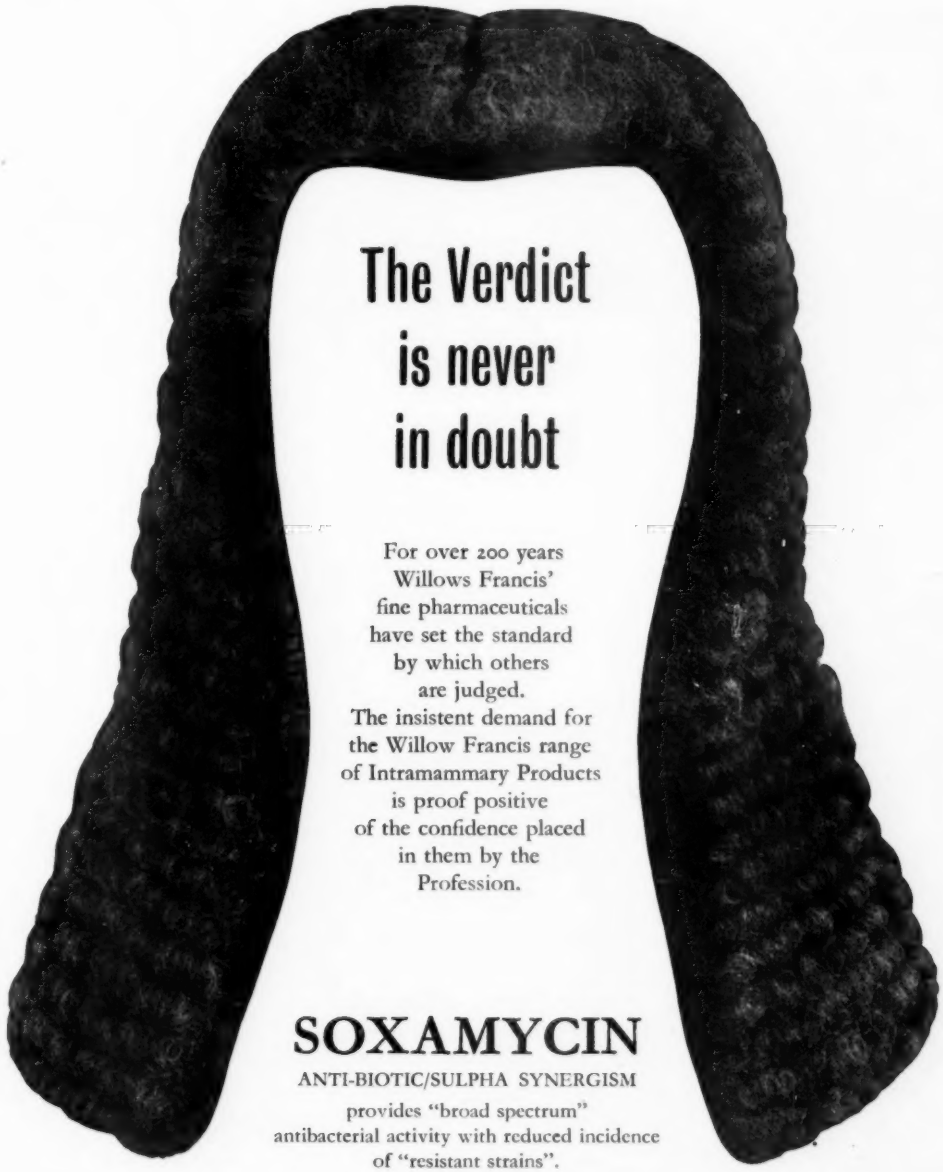
By using this type of therapy we envisaged that tissue inflammation, hormonal upset and pyrexia would be adequately catered for, and that, provided the agalactia was not due to the primary secretory failure of udder hypoplasia, as mentioned by Dr. Cross, we should obtain a satisfactory response.

Causes of Agalactia

Many of the cases of infective agalactia seem to be associated with *Corynebacterium pyogenes* or *Bacterium coli* organisms. An example of the incidence of agalactia on one farm where 43 cases were recorded in a year is summarised as follows:—

(a) Cases due to *C. pyogenes*	4
(b) Cases due to *B. coli*	30
(c) Agalactia due to lack of milk let down factor in gilts	4
(d) Cases of unknown aetiology	5

From previous cases we find that, where the causal organism is *C. pyogenes*, mortality in agalactia can be up to 100 per cent. of the young pigs, with an average probability of 70 per cent. and in cases associated with *B. coli* the death rate is about 20 per cent. lower.



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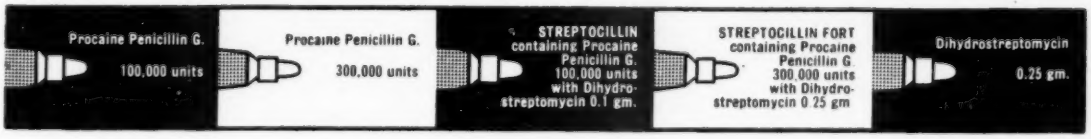

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Case Histories

Two typical cases are described to illustrate the principle clinical features of two types of agalactia and the way in which they responded to treatment:—

Typical case of B. coli *infection*

Vaginal discharge may be present, either as a clear or flocculent fluid. Even when no discharge is present, it has been our experience to find thick tacky mucus on the thermometer after insertion *per vaginam*.

The temperature in this type of case is seldom, if ever, more than one degree above normal, and often records normal.

The udder and teats show no hardness or swelling, and after an injection of penicillin and streptomycin the milk flow usually returns within 18 hours (one case which proved an exception to this rule had a temperature of 106, with slight hardening of the udder and a discharge in which *B. coli* was the predominating organism. Penicillin and streptomycin were given with no results. The sow was then given 1.5 gm. oxytetracycline,* parenterally, after which she made an uneventful recovery).

Typical Case of C. pyogenes *Infection*

Vaginal discharge is usually present in the form of a thick and creamy discharge, the temperature is raised approximately two degrees and the udder is uniformally hard throughout its entire length. The sow often lies down to prevent piglets suckling.

Twenty-four hours after mixed antibiotic treatment, with at least 2 injections in 24 hours, the sow revives her appetite but there is seldom any rapid improvement in milk yield, and it is usual to find 60 to 80 per cent. of the litter dead from starvation.

For this type of agalactia we have used, in the past, pituitrin with a mixed antibiotic injection (*i.e.*, penicillin/streptomycin), but the return of milk has usually been too slow to save the litter. In many cases the hardness has persisted in the udder some time after the infection has been overcome.

Using a 30 mg. injection of prednisolone†, together with antibiotics, we have found that a gradual return of milk takes place over 24 hours with softening of udder and no recurrence of hardness has been found in any cases.

It is, perhaps, worth mentioning that 2 cases showing hardness of the udder 12 hours before farrowing were treated with 30 mg. prednisolone without antibiotics. In these cases no discharge developed and there was no agalactia after farrowing. However, in 3 other cases which were treated in a similar manner agalactia was not prevented, although it was not so marked as usual on this farm.

Discussion

The above cases are typical of those treated in this district where *C. pyogenes* agalactia has previously produced an average of 70 per cent. litter mortality.

From the number of cases treated the conclusion has been reached that where agalactia is a sequel to metritis and there is gross local or general hardening of the udder, prednisolone is a most useful adjunct to the treatment.

It has been found, during the evaluation of prednisolone in this condition, that whatever the vital factor is in producing a return of milk, corticosteroid therapy in conjunction with antibiotics has produced better results than have been experienced previously. This is born out by the significant reduction in litter loss.

It has also been observed that the sooner the sow is seen by the owner to be losing her milk and veterinary treatment is commenced, the more successful is the treatment in getting back to a full milk yield and saving the young pigs.

Reference

Cross, B. A. (1957). *Vet. Rec.* **69**, 1,216.

* Pfizer brand oxytetracycline (Terramycin).

† Pfizer brand prednisolone (Deltacortril).

EXPORT OF HORSES FROM EIRE

Having regard to the public interest in this matter and the many articles which have appeared in the newspapers, we have arranged for a member of the profession to send us a factual note. It is hoped to receive and to publish this in the near future.

ANIMAL FEEDING-STUFFS IN THE U.S.A.

A Food and Drug Administration proposal that 37 compounds serving as the source of minerals in animal feeds should be generally recognised as safe was announced recently. The action is a further move to comply with provisions of the Food Additives Amendment, which, FDA pointed out, covers substances added to animal feeds as well as those for human foods.

The Agency has listed the minerals, with limits on amounts to be used, for consideration by qualified experts throughout the country. Included in the proposal, published in the Federal Register, are compounds which are the sources of cobalt, copper, iodine, iron, manganese, and zinc.

FDA recognises the practice of adding mineral salts to feed mixtures for swine, cattle, poultry, and sheep. It has been scientifically demonstrated, however, the Agency states, that harmful effects can result from feeding excessive amounts of these compounds. The current limitations on amounts to be used in feeds are intended to define safe levels for the total ration to prevent possible harm to animals.

Under the agency proposal, cobalt would be restricted to use as a feed supplement for ruminants —cattle, sheep, and goats. Zinc would be restricted to use as a feed supplement for swine and poultry only. These restrictions, the agency said, are based on data indicating that cobalt and zinc have value only for the animals specified. No restrictions as to species of animal are proposed for the other minerals because they are believed to have some value for all animals.

Salmonella dublin Infection in a Lambing Flock

BY

W. A. WATSON

Veterinary Investigation Centre, Ministry of Agriculture, Leeds

SUMMARY.—An outbreak of Salmonella dublin *infection in a lambing flock is described, in which 12 out of 298 ewes died after giving birth to dead lambs from which* Salm. dublin *was isolated. Thirty-six ewes in all aborted or gave birth to stillborn lambs, and 40 lambs born alive died in the first month of life.*

Salm. dublin *was isolated from 46 of 65 lambs examined, and from the faeces of 2 dogs, droppings from wild geese, and a faeces sample from a calf.*

Furazolidone was administered to 50 ewes before lambing without any effect on the course of the disease.

The possible sources of infection are discussed.

ALTHOUGH *Salmonella abortus-ovis* and *Salmonella typhimurium* are not uncommonly found as pathogens in sheep, the occurrence of *Salmonella dublin* infection is more unusual.

Salm. abortus-ovis causes abortion in pregnant ewes, both in this country and in Europe, and is relatively host-specific (Buxton, 1957 ; Endrejaat, E., 1955). Infection frequently becomes generalised in the ewe and the majority of infected ewes may abort. *Salm. typhimurium* infection was recorded by Newsom and Cross (1924–5, 1930, 1935) amongst lambs in transit, and in the opinion of these workers the predisposing cause was a long rail journey with insufficient food. Jebson (1950) recorded the infection in New Zealand on 21 separate premises over a 12-month period, losses ranging from 1 to 3 per cent. of the ewes carried on the farm. Crowther (1957) also reported 5 outbreaks of the disease in Cyprus. Associated with infection in these were pyrexia and acute diarrhoea followed by death in 1 to 3 days.

Salm. dublin infection in goats has been reported by Levi (1949) and Gibson (1957) ; Buxton (Buxton & Field, 1949) recovered the organism from the mesenteric lymph gland of a sheep during a routine examination of 62 specimens from an abattoir. The first report of *Salm. dublin* as a pathogen in sheep was that of Shearer (1957). Abortions and stillbirths dominated the clinical picture in this flock, and *Salm. dublin* was recovered from either faecal or vaginal swabs from 14 out of 49 ewes examined. The ewes showed no scouring but there was a purulent vaginal discharge after abortion. There was no record of any losses amongst the ewes or in lambs born alive but serological examination suggested 9 others to have been infected out of a total of 80 ewes.

The outbreak of disease described in the present article is of interest because of the high infection rate and the extent of the losses.

History

The flock, which had been established for over 10 years, consisted of 298 half-bred (Border Leicester × Cheviot) breeding ewes and 6 rams. Many of the ewes were old and broken mouthed. The rams comprised 1 Oxford Down and 5 Suffolks. The flock grazed extensive parkland in company with a beef herd and a small group of St. Kilda black sheep. None of the latter was, apparently, affected during the outbreak.

Lambing was due to commence during the first week of March, 1959, but on February 2nd 1 of the ewes aborted a single lamb which was not submitted for laboratory examination. During the period between February 16th and 23rd, 6 ewes aborted their lambs, 4 dying after the act of abortion. Of the 2 ewes which aborted on February 23rd, one delivered triplets and these were received at the Veterinary Investigation Centre, together with portions of placentae. Examination of the placentae was negative for the inclusion bodies of enzootic abortion. Cultures from the foetal stomachs were negative for *Vibrio fetus* but yielded pure growths of *Salm. dublin*. From this date a large proportion of the aborted foetuses and dead lambs from the flock was submitted to this laboratory for examination, which led subsequently to the investigation described in this article.

Field and Laboratory Investigations

(*a*) *Field Investigations*

On March 5th blood samples were collected from the 6 rams and from 15 of 19 ewes which had aborted. The other 4 ewes had died. Vaginal and rectal swabs were also taken from the ewes and rectal swabs from the rams. In addition, milk samples were collected from 2 ewes.

On March 11th rectal swabs were taken from 22 clinically normal ewes with healthy live lambs and at the same time samples were taken from 6 ewes which had delivered stillborn lambs. Two bitches on the farm were swabbed rectally on this date and this was repeated on April 29th. These animals had been in the habit of eating cleansings but showed no evidence of disease.

Canada geese (*Branta canadensis canadensis*) grazed over the pasture which formed part of the sheep run. Droppings from these birds were examined on March 18th.

Some beef calves had had recent contact with the sheep flock and 2 of these were scouring on March 31st. Faeces samples were collected on this date. A rectal swab from a third calf which commenced to scour on April 6th was also examined.

Coincident with the high incidence of abortions and stillbirths, healthy lambs were born. Some of these died after scouring and losing condition, but others were found dead, having shown no signs of disease. A total of 40 lambs, healthy at birth, was examined at the laboratory over a period of 5 weeks, the oldest lamb to die being 4 weeks of age. Deaths

in the ewes continued following the birth of dead lambs until a total of 12 ewes had been lost. There was marked loss of condition before death. The wool became loose, some diarrhoea occurred, and there was also a foul-smelling vaginal discharge in most cases.

In order to correlate the results of the serological examinations for *Salm. dublin* in this flock with those in apparently normal ewes, 26 ewes between the ages of 1 and 4 years, from 4 separate flocks, were blood sampled. On none of the farms was there any record of Salmonella infection in any stock.

(*b*) *Laboratory Investigations*

Methods. The original isolation of *Salm. dublin* from the triplets was made in the course of the routine examination of all aborted ovine foetuses received at the laboratory. The medium used was a Tryptose infusion blood agar incubated in 10 per cent. CO_2 at 37° C. for 24 hours. Following this original isolation, the vaginal and faecal swabs taken from the adult animals in the flock were inoculated into tubes of selenite broth (Oxoid) and incubated at 37° C. for 24 hours before plating out on desoxycholate citrate (Difco) agar. In most cases stomachs of aborted lambs, and liver and small intestine of lambs dying after birth, were cultured in a similar manner. Slide agglutination tests were performed on individual colonies. The agglutination test was performed against "O" and "H" antigens prepared from a *Salm. dublin* strain isolated from one of the ovine foetuses. The tubes were incubated in a water bath overnight. Doubling dilutions from 1 : 40 to 1 : 640 were used. Twenty-one serum samples were also examined by the complement fixation test for enzootic abortion antibodies.

Eight cultures of *Salm. dublin* from various sources were submitted to Dr. Joan Taylor for biochemical examination.

Results. Bacteriological examinations of the aborted foetuses and lambs dying after birth showed a large proportion to be infected with *Salm. dublin.* Examinations for other pathogens and clostridial toxins were negative, with 3 exceptions where *Fusiformis necrophorus* or a haemolytic pasteurella was present together with *Salm. dublin.* Small necrotic foci throughout the liver substance were seen in 3 of the lambs examined. *Salm. dublin* was isolated in pure culture from these organs. These findings are summarised in Table I.

The results of the examinations of some of the blood samples, vaginal and rectal swabs are set out in Tables II and III.

TABLE II

RESULTS OF FAECAL AND VAGINAL CULTURAL EXAMINATIONS AND SEROLOGICAL EXAMINATIONS OF BLOOD SAMPLES FROM EWES AND RAMS EXAMINED ON MARCH 5TH

	Animal	Culture for *Salm. dublin*		Agglutination test for *Salm. dublin*		E.A.E. C.F. test
		Faecal	Vaginal	Titre "O"	Titre "H"	
1.	Aborted ewe	+	Neg.	1 : 640	1 : 320	Neg.
2.	„ „	+	Neg.	1 : 640	1 : 320	Neg.
3.	„ „	Neg.	Neg.	1 : 160	1 : 320	Neg.
4.	„ „	+	+	1 : 640	1 : 320	Neg.
5.	„ „	+	+	1 : 640	1 : 320	Neg.
6.	„ „	+	+	1 : 640	1 : 320	Neg.
7.	„ „	Neg.	+	1 : 640	1 : 320	Neg.
8.	„ „	Neg.	Neg.	1 : 640	1 : 320	Neg.
9.	Weak twins dying in 6 hours	Neg.	+	1 : 40	Neg.	Doubtful
*10.	Aborted ewe	Neg.	Neg.	Neg.	Neg.	Weak +
11.	„ „	+	+	Neg.	Neg.	Weak +
12.	„ „	Neg.	Neg.	1 : 40	1 : 320	Neg.
*13.	„ „	+	+	1 : 320	1 : 320	Neg.
14.	„ „	+	+	Neg.	1 : 80	Neg.
15.	„ „	+	+	1 : 320	1 : 320	Neg.
16, 17, 18, 19, 20.	Rams ...	Neg.		Neg.	Neg.	Neg.
21.	„ ...	+		Neg.	Neg.	Neg.

* Milk samples from numbers 10 and 13 were also cultured. *Salm. dublin* was isolated from number 10 but 13 was negative.
KEY: "H" = Flagellar titre. "O" = Somatic titre.
E.A.E. C.F. test = Enzootic abortion of ewes complement fixation test.

TABLE III

RESULTS OF FAECAL AND VAGINAL CULTURAL EXAMINATIONS AND SEROLOGICAL EXAMINATION OF BLOOD SAMPLES FROM EWES DELIVERING STILLBORN LAMBS
(Specimens collected on March 11th)

	Culture for *Salm. dublin*		Agglutination test for *Salm. dublin*	
	Faecal	Vaginal	Titre "O"	Titre "H"
1.	+	+	1 : 320	1 : 40
2.	Neg.	Neg.	Neg.	Neg.
3.	+	+	1 : 320	1 : 320
4.	+	+	1 : 80	Neg.
5.	+	+	1 : 320	1 : 320
6.	+	+	1 : 320	1 : 320

KEY: "H" = Flagellar titre. "O" = Somatic titre.

Salm. dublin was recovered from either rectal or vaginal swabs, or from both, from 11 of the 15 ewes examined on March 5th; this organism was present

TABLE I

ISOLATIONS OF *Salm. dublin* FROM *Post-mortem* MATERIAL OBTAINED FROM THE AFFECTED FLOCK

Material	Number examined	Age	Number positive for *Salm. dublin*	Organs positive for *Salm. dublin*			
				Brain	Stomach	Small intestine	Liver
Foetuses ...	24	100 days—full term	18	1	17	1	1
Placenta ...	1	Full term	1	—	—	—	—
Lambs ...	40	1 day—4 weeks	28	—	6	26	16

in 1 of the 2 milk samples taken on this date. The serological examinations revealed that most of the ewes had "O" and "H" titres to *Salm. dublin* antigens. None of the rams had a positive titre but 1 old ram which had been in the flock for over 4 years was found to be excreting *Salm. dublin*. This animal had been losing condition over the preceding 6 months. Of the 21 blood serum samples submitted to a complement fixation test for antibodies against enzootic abortion in ewes, 2 gave weak positive reactions and 1 proved doubtful; the vast majority were negative.

Examination of several of the numerous cultures of *Salm. dublin* obtained during the course of the investigation and submitted to Dr. Joan Taylor revealed that the only sugar giving any differentiation between these strains was arabinose (Taylor, 1959).

Animal	*Days on which arabinose fermented*
Goose ...	3 days
Ovine foetus	Nil
Calf ...	7 days
Lamb ...	7 "
" ...	4 "
" ...	Nil
" ...	3 days
" ...	6 "

Table III requires little comment. It would appear that the abortion of No. 2 was unrelated to *Salm. dublin*, and it is possible that that of No. 4 was the result of a late infection with this organism.

The results of the examinations of the remainder of the material collected during the course of the investigations are difficult to tabulate. They may be summarised in the following way:—

1. Four of the rectal swabs taken from 22 clinically normal ewes with healthy live lambs on March 11th, were positive for *Salm. dublin*.
2. Rectal swabs from the 2 bitches were also positive on this date, but when again sampled on April 29th the swabs did not show any infection.
3. Droppings from the Canada geese examined on March 18th were positive for *Salm. dublin*.
4. The 1 faeces sample from a calf taken on April 6th gave a positive culture for *Salm. dublin*.
5. Of the 26 ewes sampled on farms with no record of Salmonella infection, the highest somatic titre shown was 1 : 40 in only 2 samples. The highest flagellar titre found was 1 : 80 in 7 of the 26 samples.

Therapeutic Trial

Design

On March 18th, 50 ewes still to lamb were taken at random and isolated from the main lambing flock for treatment, leaving 236 as untreated controls. These were given furazolidone in the form of Neftin Premix ¾ oz. per head, per day, in a trough concentrate. As ewes in the treated group lambed they were returned to the main flock. All lambs aborted or stillborn from both groups were submitted for examination.

Results

One abortion occurred in the treated group and 5 amongst the untreated controls. These foetuses all gave a growth of *Salm. dublin*. No firm conclusions can be drawn from this therapeutic trial, as treatment was instituted too late in the outbreak to assess its effect on the disease in the pregnant ewes. It should be noted that a number of lambs died from *Salm. dublin* infection after birth (Table I), some as old as 4 weeks.

In order to determine the distribution of infection in the flock and the possible effect of treatment in the elimination of carrier animals, blood samples and rectal swabs were taken from 34 identifiable treated ewes on April 15th and 21st. No ewes were found to be excreting *Salm. dublin* but a number showed high "O" and "H" titres (Table IV). Comparing these

TABLE IV
RESULTS OF THE SEROLOGICAL EXAMINATION OF BLOOD SAMPLES OF EWES AFTER TREATMENT WITH FURAZOLIDONE

Numbers	Agglutination test for *Salm. dublin*	
	End "O"	Titre "H"
6	Neg.	Neg.
1	Neg.	1 : 40
2	Neg.	1 : 80
3	1 : 40	1 : 40
3	1 : 40	1 : 80
5	1 : 80	1 : 40
4	1 : 80	1 : 80
2	1 : 40	1 : 160
3	1 : 160	1 : 40
1	1 : 40	1 : 640
1	1 : 40	1 : 320
1	1 : 80	1 : 320
1	1 : 80	1 : 160
1	1 : 160	1 : 320
Total 34		

KEY: "H" = Flagellar titre. "O" = Somatic titre.

titres with those found in normal sheep in other flocks, it may be concluded that 10 had titres indicative of past or current infection.

On April 29th, 51 control ewes were swabbed rectally, and none of these was found to be excreting the organism. None of these ewes was blood sampled.

Discussion

During 1957 many calves were lost on the farm with enteritis, and the following year an outbreak of disease similar to the present one occured in the lambing flock. No attempt was made either in 1957 or 1958 to obtain a diagnosis of the infection present on the farm.

It would seem possible that the present outbreak of disease followed an earlier infection with *Salm. dublin* in the breeding flock during 1958 and this may have originated from the beef herd the previous year. Buxton (1957) records the isolation of *Salm. dublin* from the following species: Horse—2; Cow—52; Goat—2; Sheep—1; Pig—3; Dog—2; Fowl—4; Turkey—1; Canary—1; Fox—5; Mink—1; Rat—1. In view of the distribution of infection in various species, and after considering the past history of disease on the farm, it would seem probable that

(*Continued on page* 65)

Observations on Swine Dysentery and Associated Vibrios

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SUMMARY.—Swine dysentery of weaned pigs associated with acute and subacute colitis is described. From the colons and mesenteric lymph nodes of affected pigs two distinct types of vibrios have been isolated, one being biochemically and morphologically similar to V. fetus.

Transmission experiments on susceptible pigs using both types of vibrios failed to reproduce the disease.

Examination of normal bacon pigs resulted in the isolation of vibrios from 15 *out of* 28 *pigs and it is concluded that vibrios are normal commensals of the pigs' colon.*

SWINE dysentery, or bloody diarrhoea, was first described by Whiting, Doyle and Spray in America in 1921; it was transmitted by Whiting in 1924 by the oral administration of stomach and colonic contents from sick pigs. The disease was not associated with a vibrio until Doyle (1944) isolated

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Salmonella dublin **Infection in a Lambing Flock.—** *Concluded.*

Salm. dublin first caused an apparent infection in calves in the beef herd and then passed to the breeding ewes.

There was no evidence of the disease in the flock of St. Kilda sheep on the farm, although the possibility that some of these were carriers cannot be disregarded. The wild geese could well have acquired infection through grazing pasture contaminated by the sheep, and the dogs, which were symptomless carriers for a time, probably obtained the infection from eating the aborted material.

As already stated, biochemical tests revealed that the only sugar giving any differentiation between the strains of *Salm. dublin* from various sources was arabinose. The strains were not submitted to phage typing, although this has provided valuable epidemiological evidence on occasion (Jebson, 1957). Smith (1951, 1959), however, noted that it is usually of limited value because the majority of strains belong to Type 1.

The serological response to *Salm. dublin* in sheep is of interest. The picture of agglutinin response in normal ewes between 1 and 4 years appears to resemble that in cattle of a similar age group. Thus Field (1948), in a herd of cattle in which there was no known history of Salmonella infection, found only 1 of 41 animals in the age group 1 to 3 years with a flagellar titre as high as 1 : 160, and 2 with a somatic titre of 1 : 40.

In the majority of ewes in the present outbreak excreting *Salm. dublin* there was a marked rise in antibody titre, both somatic and flagellar. However, 5 animals which were shown to be excreting *Salm. dublin* had low blood titres. This, again, is similar to findings in adult bovine animals (Field, 1948).

In marked contrast to the high flagellar response found in young goats (Gibson, 1957 ; Levi, 1949), the " H " antibody titre at the time of sampling was above 1 : 320 in only 1 of 61 animals, and from this particular animal *Salm. dublin* was not recovered.

Sampling of the 34 identifiable treated ewes 3 weeks after lambing revealed 10 with either significant " O " or " H " titres, indicating past infection, although none was shown to be excreting the organism. There would, therefore, appear to have been an approximate 30 per cent. infection rate in the flock. The fact that on the same date 51 control ewes were also not excreting the organism when sampled would indicate that all the ewes had ceased to be excretors rather than that treatment had had any effect on the carrier ewes.

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Dr. J. A. A. Watt kindly examined the sera, and Dr. Joan Taylor the Salmonella cultures. Messrs. Smith, Kline and French supplied the furazolidone used.

Without the enthusiasm of the technical staff of this laboratory and the farm staff concerned, the work would not have been possible. Mr. G. S. Powley, M.R.C.V.S., kindly gave me every encouragement to investigate this outbreak.

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an organism of this genus from the colonic mucosa of pigs affected with disease. This vibrio was capable of reproducing a diarrhoea in pigs not unlike the naturally occurring disease but less severe in its effects. Later, James and Doyle (1947) were able to confirm these results in more extensive transmission experiments and were able to reproduce the symptoms of the disease in 50 out of 60 pigs by dosing with culture suspended in a gastric mucin base.

Since then the disease, and the recovery of vibrios, have been recorded in a number of different countries. Schmid (1949) in Switzerland, Truszezyeski (1957) in Poland, Van Ulsen (1953) in Holland, Gorrie (1952) and Roberts (1956) in Australia.

Little reference has been made to a comparable disease in Great Britain except by Birrel (1957) in a clinical paper describing an acute dysentery in pigs in which the only diagnosis was made by demonstrating vibrios in smear examination from the affected mucosa. No attempts at transmission were made.

This paper reports swine dysentery as seen in the south of Scotland, the isolation of vibrios from the intestinal mucosa of affected and healthy pigs and describes limited transmission experiments in susceptible pigs with the vibrios isolated.

Incidence

Outbreaks of diarrhoea or dysentery in pigs from which vibrios can be isolated are fairly common in the south-east of Scotland. The outbreaks are uncommon in suckling pigs and breeding stock and are most commonly found in post-weaned pigs at 8 to 11 weeks of age.

Symptoms

The diarrhoea often starts suddenly in newly weaned pigs, the faeces varying from a yellow watery fluid to a mild diarrhoea with the colour and consistency of sloppy porridge. Blood is seldom seen in the droppings, but not infrequently mucus is present in varying amounts.

In acute outbreaks the pigs are dejected, with arched backs, limp wet tails, and sunken eyes. There is a rapid loss of weight, and a desire for water is often evident. At no time does there appear to be a marked rise in temperature and the pigs become thin, hairy and dehydrated. In mild outbreaks dejection, loss of weight, and loosening of the faeces are often the only signs of illness.

The mortality rate in this age of pig is variable and seldom reaches a high level; but pigs may die at intervals from an indeterminate cause. The diarrhoea tends to persist for an indefinite period and often there is a temporary improvement in the consistency of the faeces. Acute diarrhoea, however, tends to recur periodically, and it has been noticed that once the initial looseness has been overcome the faeces still show a degree of softness, with much unchanged and apparently undigested meal being passed.

This type of diarrhoea has been seen under all systems of management and with diets of varying suitability. On certain of the farms affected it assumes an endemic form affecting most of the pigs after weaning.

Post-mortem Findings

The lesions are invariably confined to the alimentary tract and little abnormality has been noticed elsewhere. The stomach often contains much fibrous straw and extraneous matter. The small intestine shows little sign of enteritis, but often the contents are fluid and bile-tinged. Some degree of enteritis is, however, present in the region of the ileocaecal valve and for a distance of about 1 to 2 inches proximal to this point with, occasionally, slight surface necrosis of the mucosa.

In acute cases the large bowel is very flaccid and is abnormally full of fluid of the consistency of a fine watery gruel. The walls of the caecum and colon are thin, the mucosa is of a diffuse red colour, but only occasionally have the contents been markedly discoloured with altered blood.

In less acute cases the mucosa of the caecum and colon is covered with a yellow diphtheritic exudate with particles of food adhering to it. These areas of diphtheresis appear to form in patches and can easily be removed with the fingers leaving a moist reddened granular surface. At this stage there is little evidence of thickening of the wall of the colon although the mucosa tends to become ridged.

In the more chronic type of lesion the wall of the colon is thickened and the mucosa is formed into folds the tops of which are heaped up with a layer of necrosis, the valleys between the ridges or folds appearing reddened, granular and moist with meal particles adhering to the exudate. Occasionally small ulcers are present. The rectum frequently shows the same lesion. The mesenteric lymph nodes are invariably enlarged, swollen, and when the disease is acute distinctly juicy with the mesenteric blood vessels distended and swollen with blood. The colic lymph nodes are also distinctly enlarged.

The over-all picture in the chronic type of the disease is consistent with that known as necrotic enteritis.

Bacteriological Examination

All dead pigs from outbreaks of diarrhoea were subjected to an extensive general bacteriological examination, and by this method such specific diseases as salmonellosis or specific coliform enteritis were eliminated, and apart from coliform organisms invariably isolated from the intestine no other specific organisms associated with dysentery or diarrhoea in pigs were recovered after aerobic cultivation. At the same time a more detailed bacteriological examination of the small intestine, caecum, colon, and mesenteric and colic lymph nodes was carried out for organisms of the vibrio group which had been repeatedly seen on faecal smear examination.

The portion of bowel to be cultured from was washed clean of faecal material, the mucosa dried with filter paper, and the surface lightly seared with a hot spatula. Using a sterile loop of stiff wire or a scalpel blade a thin scraping of the seared

mucosa was stripped off, the reflected surface scraped with a sterile loop and streaked out on to 10 per cent. ox-blood agar culture plates. Depending on the degree of heat used to sear the bowel the stripping of the mucosa was easily accomplished, the top contaminated necrotic mucosa layering off easily.

A similar procedure was used for the lymph nodes and a loopful of the substance of the gland was taken aseptically and was streaked out on to standard ox-blood agar culture plates.

The culture plates were thereafter incubated at 37° C. in sealed jars in an atmosphere containing 10 per cent. CO_2 and were examined after 48 and 72 hours' incubation.

By using these methods gross contamination with coliform and other normal inhabitants of the gut was cut to a minimum and did not constitute a problem when the culture plates were examined after incubation.

Vibrios were recovered readily from the caecum, colon, rectum and the lymph nodes, but they have not been isolated so readily from the ileum except in cases where the terminal portion showed an extension of the disease from the caecum.

Characteristics of the Organism

So far 2 distinct types of microaerophilic vibrios have been isolated from outbreaks of diarrhoea, and for convenience they have been classified according to Florent (1957) and designated Types I and II. The more common isolate, Type II, has shown the following characteristics.

Type II

Morphology The organism is gram-negative, stains well with dilute carbol fuchsin and is generally seen as spirally curved rods of 1 or 2 turns, the familiar seagull forms being common. On prolonged incubation the organism becomes granular with an increasing number of round coccal forms. The organism is actively motile and a single polar flagellum is present.

Colony Characteristics The organism is microaerophilic, and after 48 hours' incubation on 10 per cent. ox-blood agar culture plates the colony is circular, low convex and entire edged ½ to 1 mm. in diameter. The colony tends to elongate along the lines of the streak, neighbouring colonies often coalescing; and if the incubation has taken place in a damp atmosphere swarming is common. In reflected light the colonies are grey in colour, but in transmitted light they are of a watery blue colour. After a further 24 hours' incubation the colonies tend to become rougher, more opaque, and the medium below the colony tends turn a greenish colour.

The organism grows well on sub-cultivation on the common laboratory media and the growth is enhanced by the addition of blood. On nutrient agar plates the colonies are tiny dew-drops slightly blue in colour and only slightly opaque. Growth is obtained on McConkey's medium. The colony is easily emulsified.

Growth in liquid media The organism grows well in Peptone water and nutrient broth but slightly heavier growths have been obtained after enrichment was either defibrinated blood or with Fildes' digest at the rate of 1 drop per 2 ml. broth. After 48 hours' incubation there is a uniform turbidity with a slight flocculent deposit which is dispersed on shaking. After 72 hours' incubation there is a grey pellicle, the deposit has increased, and on shaking disperses through the medium as tenacious slimy strands.

Biochemical reactions No change is produced in the following sugars after 96 hours' incubation:—lactose, glucose, sucrose, xylose, maltose, mannitol, sorbitol. There is no alteration in litmus milk. The organism does not produce indole, does not liquefy gelatin, reduces nitrates to nitrites, is methyl red negative and is catalase and H_2S positive.

Pathogenicity for laboratory animals The organism has not been found to cause ill effects to the rabbit, guinea-pig or mouse by subcutaneous or intraperitoneal injection.

Type I

The second strain of vibrio, designated Type I, shows certain differences from the previous strain and they can be listed as follows:—

Colony Differences The colony of the Type I vibrio is smaller than Type II and may be missed on primary isolation after 48 hours' incubation. It rarely exceeds 0.5 mm. in diameter, and after 72 hours' incubation resembles a round convex dew-drop, slightly opaque. Even after prolonged incubation the colonies never reach the size of the Type II colonies.

Morphology Morphologically both types are similar, but Type I is finer and more slender.

Growth in liquid media The Type I vibrio grows well in fluid media but the growth is lighter and the turbidity is more uniform than Type II. The pellicle, after 72 hours' incubation, is less marked and the suspension on shaking breaks up into an even suspension without the characteristic slimy strands of Type II.

Biochemical reactions The Type I vibrio differs in that it has been consistently H_2S negative when freshly isolated, although after prolonged subcultivation over a period of 9 months some H_2S is produced.

Attempted Transmissions

Two major attempts at transmission were carried out using newly weaned 8-week-old pigs.

In the first experiment 2 pigs were dosed with a concentrated 72-hour broth culture of freshly isolated vibrio Type I suspended in a gastric-mucin base. Two pigs were retained as controls and isolated. After 24 hours both dosed pigs showed slight softening of the faeces, and after a further 24 hours slight looseness had developed with both pigs slightly off colour. Within 5 days the transient diarrhoea had cleared up; all 4 pigs were penned together, and dosed orally with cultures of vibrio Types I and II. This dose was repeated in 10 days' time. No ill-effects were noticed and the pigs were slaughtered 2 months later. *Post-mortem* examination revealed no abnormalities.

In the second transmission experiment 6 healthy pigs of the same age were used. In view of the fact that a number of reports had indicated that a stress factor influenced the extent and severity of vibrionic diarrhoea the pigs were subjected to very unfavourable environmental conditions with frequent drops of temperature to below freezing point. Two of the pigs were dosed orally and given deep intra-rectal inoculations of vibrio Type I, and the remaining 4 control pigs were housed in isolation. Forty-eight hours later further oral, intra-rectal, and intravenous inoculations of cultures of vibrios Type I and II were administered. Both the dosed and the control pigs remained healthy, and in view of this all 6 pigs were penned together and were eventually slaughtered 8 weeks later when *post-mortem* examination revealed no gross abnormality.

Recoveries from Normal Pigs

As a result of the isolation of vibrios from pigs suffering from dysentery attempts were made to investigate the vibrio flora of normal healthy slaughterhouse bacon pigs. At first the same technique of recovery was adopted, but this was eventually discarded as it was soon realised that the healthy mucosa did not present the same problems. The inoculum used, therefore, was taken from the washed surface of the colon. The colons from 28 pigs were subjected to bacteriological examination and vibrios were recovered from 15. On biochemical examination all 15 strains fell into the Type II classification. The organisms were present in very small numbers.

Discussion

The type of vibrio associated with swine dysentery has been named *V. coli* by Doyle (1948) and shows some resemblance to *V. fetus*. Roberts (1956) indicates that the strain of vibrio isolated from the outbreaks of swine dysentery described by him resembled *V. fetus*, was catalase positive and H_2S negative, but produced a heavier growth on solid media than *V. fetus*. Florent (1957) recovered 2 strains of *V. coli* from pig intestines, namely Type I which was catalase positive and H_2S negative and which was morphologically, biochemically, and antigenically similar to *V. fetus*, and Type II which was catalase positive and H_2S positive. In the work under discussion both types of vibrio were recovered from cases of dysentery and have been classified according to Florent. The coarser Type II has been the more common isolate but Type I vibrio would also appear to be more invasive than Type II in that it has been recovered more often from the mesenteric and colic lymph nodes. Both strains have, however, been recovered frequently from the same pig and both strains were used in the transmission experiments.

Dysentery of pigs associated with a vibrionic organism has been reported as a severe disease with, in many instances, a high death-rate reaching up to 80 per cent. in unweaned pigs and up to 50 per cent. in older pigs with an average loss of 25 per cent. The type of dysentery met with in the south-east of Scotland and described in this paper is seldom seen in such an acute form, and indeed heavy losses are uncommon. It is also rare in suckling pigs and tends to be a disease of the weaner pig. Nevertheless, the symptoms of the disease and the *post-mortem* findings would appear to be identical to those described by Doyle (1945) in that the lesions are primarily confined to the caecum and colon with accompanying involvement of the lymph nodes draining the affected bowel. There is often, too, a marked line of demarcation between the normal and the pathological in the region of the ileo-caecal junction. Blood and mucus in the faeces, however, were seen only occasionally in the outbreaks under discussion and are by no means a constant finding. In many respects the disease would appear to be of an infectious nature. No evidence was found of salmonellosis or coliform enteritis and the clinical history is not suggestive of transmissible gastro-enteritis (Doyle & Hutchings, 1946).

Recoveries of vibrios from normal pigs have been reported by a number of authors (v. Balmoos, 1950; McNutt, 1953; Truszezyaski, 1957), and of the 15 recoveries in this survey from 28 normal pigs all proved to be of Type II. The fact that Type I vibrios were not isolated from normal pigs is interesting in that as previously stated above this strain would appear to be more invasive and could be recovered readily from infected pigs. However, as Type II vibrios were present in very small numbers in normal pigs it may be that Type I was overlooked and these findings would indicate that Type II vibrio at least is a normal commensal of the pig's colon but it does not rule out the possibility that the same may be true of Type I. The fact that these strains are much more numerous in cases of dysentery lends little weight to any assumption of their pathogenicity, as obviously the bacterial flora would be upset and much changed in such inflammatory conditions.

The disease as described in Europe appears to be more severe than that described by Doyle, the lesions in the former involving the stomach and the small intestine.

The association between swine dysentery and a vibrio has been described by many authors, and transmission experiments have been successful although it would appear from a number of reports that the dysentery produced was less severe than the naturally occurring disease (Doyle, 1944; Roberts, 1956). The limited transmission experiments under discussion, however, did not succeed in reproducing the natural disease even when carried out under adverse environmental conditions, and it would appear, therefore, that any rôle in disease played by the 2 types of vibrios described here is purely a secondary one, one type of vibrio at least being a normal inhabitant of the pig's colon. It is, of course, possible that the vibrios isolated from normal bowel are in some way different from those isolated from cases of dysentery, and so far no tests have been shown to differentiate commensals and possible pathogens. In the above survey it is concluded that vibrios were of minor importance and that the cause of this type of dysentery must be sought elsewhere.

(Continued at foot of adjoining column)

News and Comment

FEED ADDITIVES AND HORMONE IMPLANTS FOR FARM ANIMALS

Dr. R. Scarisbrick, Deputy Chief Scientific Officer of the Agricultural Research Council, recently addressed members and guests of the Farmers' Club in London on the use of feed additives and hormone implants to improve growth and fattening in farm animals. He pointed out that while more information was needed on the effects of these practices, quite extensive current research projects were in hand. He felt that if these additives exerted a useful effect the question should be put as to what were their limitations. For example, did they exert maximum effect only at a certain stage of life or in special mineral-low areas? He also questioned whether the various practices were basically sound. Could the correct concentrations of additives or hormones be truly assessed to attain good average production weight gains without the risk of affecting the whole herd or flock and even the human population?

From one aspect Dr. Scarisbrick felt concerned about what happened to the synthetic oestrogens stilboestrol and hexoestrol after administration because of their alleged carcinogenic effects following prolonged dosage. The quantities retained in the flesh of impregnated animals were, he felt, too low to have any adverse effect on human beings, but a hormone such as hexoestrol did not appear to be absorbed by plants; it adhered to leaves and might become a residual problem of grassland. Experimental work suggested, however, that hexoestrol was attacked by soil bacteria and might have only a short life.

MINISTER URGES FULL USE OF VETERINARY SERVICES

Addressing the annual general meeting of the Leicestershire National Farmers' Union at Leicester, the Minister of Agriculture said:—

"In a few weeks' time we shall declare the last eradication area in Great Britain for bovine tuberculosis. If all goes well, the whole of the country should be attested before the end of this year or at latest early next year. Many people have asked what the next steps are going to be in animal health when that job is done. This is a question to which we have been giving careful study. I cannot give you a final answer to-day but there are one or two things I can say.

"The first point is that when the area eradication of bovine tuberculosis is done with, that does not mean that we can forget about the disease. In spite of the utmost vigilance odd cases will turn up here and there, and we shall need all our care to prevent infection building up afresh. We shall have to keep on with periodical testing for a long time ahead, although we shall be able gradually to reduce the frequency of tests, especially in the older attested areas. Nevertheless the ending of area eradication will relieve the veterinary profession of much work.

"Where else can they concentrate their efforts? One of the matters which we have had under close review in this connexion is pig diseases and especially swine fever. There is no easy answer and we shall need to consult a number of different authorities. But I shall make a statement as soon as I possibly can.

"We now have about 4,500 veterinary surgeons in the country compared with about 2,000 in the 'thirties. I would say that it is up to you farmers to see that the energies of this profession are fully used. There is tremendous scope for yet greater increases in agricultural productivity by using the help and advice of the private vet."

Observations on Swine Dysentery.—*Concluded.*

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TOTAL SUPPLIES OF MILK

In the current number of the official journal of the Milk Marketing Board it is stated that sales of milk off farms in November, 1959, totalled 133¼ million gallons or approximately 1¾ million gallons more than in November, 1958. This was the first month to show an increase over the previous year since July, 1958. Daily sales averaged 4.44 million gallons as compared with 4.38 million gallons in November, 1958. From April to November, 1959, sales off farms amounted to 1,198¼ million gallons, a drop of 31¼ million gallons or 2⅔ per cent. on the corresponding period of 1958. During these eight months of 1959, liquid and manufacturing sales formed 76.5 per cent. and 23.5 per cent. respectively of total sales: the proportions in the period April to November, 1958, were 73.3 per cent. and 26.7 per cent. respectively.

R.C.V.S. FELLOWSHIP DIPLOMA

At their recent meeting the R.C.V.S. Council accepted the recommendation of the Examination and Education Committee that the diploma of Fellowship of the Royal College be bestowed upon Dr. Anthony Buxton for his thesis, "A Study of the Pathogenesis of *Salmonella gallinarum* Infection in Chickens," and upon Mr. W. M. Fitzsimmons for his thesis, "The Oxyuroid Parasites of some South African Reptiles." The diplomas will be conferred at the next annual general meeting of the Royal College.

THE R.C.V.S. TRUST

The Council of the Royal College Trust announce the following fellowships and scholarships:—

The B.O.C.M. Fellowship for research in the field of animal husbandry, hygiene, and disease control in farm livestock. Value £1,000 p.a.

The Cyanamid Research Fellowship for Studies on the Aetiology and control of Bacterial Enteritis in Calves. Value £1,000 p.a.

The Boots Research Scholarship in veterinary clinical medicine. Value £750 p.a.

Further details and application forms may be obtained from the secretary, R.C.V.S. Trust, 9, Red Lion Square, W.C.1. The closing date for the receipt of applications is March 31st, 1960.

NOTTINGHAM UNIVERSITY AGRICULTURAL SCIENCES BUILDING

At the end of last week Sir William Slater, secretary of the Agricultural Research Council, opened Nottingham University's new £240,000 agricultural sciences building at the School of Agriculture, Sutton Bonington. The university, he said, should allocate sufficient money to enable the school's scientists to enjoy the freedom to follow lines of research of their own choosing. If they ran into special problems involving additional expense they could appeal for further support to such bodies as the A.R.C.

ANIMAL HEALTH TRUST FARRIERY COMMITTEE

Eighteen months ago the Duke of Devonshire called a meeting of all interested organisations with the object of discussing "the whole position with regard to the future of farriery and to make recommendations." Representatives were present from the British Veterinary Association, the Worshipful Company of Farriers, the Royal Agricultural Society, the Rural Industries Bureau, the National Master Farriers' Association, the Hunters Improvement Society, the National Union of Agricultural Workers, the Royal College of Veterinary Surgeons, the British Horse Society, the Jockey Club, and the Animal Health Trust.

As a result of this meeting a special sub-committee, known as the Animal Health Trust Farriery Committee, was set up under the chairmanship of Dr. W. R. Wooldridge. The first report of this sub-committee has recently been issued.

It states that the number of practising farriers appears to be about 1,500 at the present time and that, although the register of the Worshipful Company of Farriers shows that about 10,000 candidates have passed the examination for the Company's shoeing smith certificate, there is no ready means of telling how many of these are still working at their craft.

It is suggested that opportunities for "live" farriery might be provided at centres where numbers of horses are still maintained, such as the Headquarters of the Royal Army Veterinary Corps at Melton Mowbray, the Equine Research Station of the Animal Health Trust, or at certain university veterinary schools.

The type of future training course envisaged by the report would combine three branches: a period of study at a technical college, a further period on "live" farriery at one of the centres mentioned, and pupilage with a registered farrier. The whole would be covered by the examinations and certificates of the Worshipful Company of Farriers.

The Committee felt that it was imperative that some form of financial assistance should be given to farriery students, and it is reported that the Racecourse Totalisator Charity Trust has agreed to assist this work to some extent.

It is estimated that, for a three-year course, an educational grant should be provided for the student, amounting in the first year to about £3 10s. per week, this being reduced in subsequent years as he becomes more useful to his principal. Financial inducement might also be given to master farriers who accept apprentices, and certain additional expenditure would be necessary to establish and equip suitable training forges.

The report concludes by making the following recommendations:—

1. That the Registration Committee of the Worshipful Company of Farriers should try to secure a fully co-ordinated system of training for farriers.

2. That the Worshipful Company of Farriers

should endeavour to make its register of farriers and farriery students realistic ones.

3. That the help of the Rural Industries Bureaux should be enlisted to check up on the existing activities of names included in the lists of farriers.

4. That the question of assisting pupils financially during their period of tutelage should be examined carefully.

5. That the possibility of assisting financially the principals—*i.e.* farriers—who are willing to accept pupils should be considered.

6. The sub-committee are of the opinion that the the Breed Societies and other societies connected with the use and welfare of the horse should be asked to support strongly from the financial point of view the work of the Worshipful Company of Farriers in connexion with the training of farriers.

7. Finally that the syllabus approved by the sub-committee for the training of farriers should be sent to the Worshipful Company of Farriers for their consideration.

8. The hope was also expressed that the Worshipful Company of Farriers should maintain the high standard of their examinations in the interests of the future of farriery.

UNIVERSITY NEWS

Cambridge

The first Keith Entwistle Memorial Lecture will be delivered in the Old Library, Pembroke College, Cambridge at 8.15 p.m. Sir George W. Pickering, M.D., F.R.C.P., Regius Professor of Medicine, University of Oxford, will speak on " Fever."

MR. THOMAS WILSON

Mr. J. McWilliam writes:—

The late Thomas Wilson was born in Nantwich in 1886. He was educated at the Acton and Nantwich Grammar School and the Royal (Dick) Veterinary College. After a brilliant academic career he qualified M.R.C.V.S. in 1907 and joined his father's veterinary practice in Nantwich.

He quickly gained a reputation as a skilful veterinary surgeon, especially in horse work—a reputation which he enhanced throughout his life. His interest in veterinary matters was widespread; he had been a member of the Lancashire Veterinary Association since qualification and had been honoured with the Presidency of that Association which he had represented for many years on the Council of the N.V.M.A.

For a number of years he served on the Council of the R.C.V.S., and up till the time of his death was an active and valued member of the Council of the National Veterinary Benevolent Mutual Defence Association.

Outside of the veterinary world he was an active member of the N.F.U. and an ex-chairman of the local branch. He acted as treasurer of a number of local alms and benevolent trusts.

A keen horseman, he had hunted most of his life with the Cheshire hounds—having acted as veterinary surgeon to the hunt for many years. In later life he confined his sporting activities to shooting and fishing—in his own words, dry fly preferably—at both of which sports he was an expert. In one period of ten days he landed 58 salmon on the Tweed.

The death of his wife in 1943 was a great blow to him. He had no children but is survived by a number of nieces and nephews, one of whom, Mr. J. B. Wilson, joined in 1948 the practice started by his grandfather.

R.C.V.S. OBITUARY

We record with regret the deaths of the following members of the profession:—

MARRIOTT, Sam Warburton, O.B.E., c/o Glyn, Mills & Co., 22 Whitehall, London, S.W.1, Major R.A.V.C. (Retd.). Graduated September 12th, 1912, at the Royal Veterinary College, London. Died December 7th, 1959.

MCELLIGOTT, Gerald, 17, Parkside, Knightsbridge, London, S.W.1. Graduated July 17th, 1917, at the Veterinary College of Ireland, Dublin. Died December 18th, 1959, aged 66 years.

PULLINGER, Edward James, Box 1620, Johannesburg, South Africa, D.V.SC. (PRETORIA), DIP. BACT. (LOND.). Graduated December 19th, 1930, at the Royal Veterinary College, London. Died November 10th, 1959.

PERSONAL

Mr. S. V. Golledge of Trowbridge retired on Thursday of last week, it is announced in the local press. He started practice in Trowbridge in 1921, carrying on the practice which his father, the late Mr. J. G. Golledge, had begun in 1889.

Mr. J. T. Baxter of the Ministry of Agriculture, Northern Ireland, has been appointed by the Board of Trinity College, Dublin, to be Professor of Clinical Veterinary Practice in the School of Veterinary Medicine.

Birth

MAYNARD.—On January 15th, 1960, to Evelyn, wife of Harvey Maynard, M.R.C.V.S., of Gillingham, Dorset, a daughter, a sister for Ann and Katherine.

MURRAY-BROWN.—On January 16th, 1960 at 89 Southwick Street, Southwick, Sussex, to Judith, wife of Ian Murray-Brown, B.V.M.S., M.R.C.V.S., a daughter.

Engagement

PLEWS—BUCKLER.—The engagement is announced between Susan, only daughter of Mr. and Mrs. G. K. Buckler, Greta Bank, Graveley, Nr. Hitchin, Herts, and Bryan, elder son of Mr. and Mrs. R. R. Plews of Barnard Castle, Co. Durham.

COMING EVENTS

January

27th (Wed.). Meeting of the Staffordshire and Derbyshire Veterinary Club at the White Hart Hotel, Uttoxeter, 8 p.m.

28th (Thurs.). Meeting of the Western Counties Veterinary Society at the Rougemont Hotel, Exeter, 2.30 p.m.

Meeting of the B.S.A.V.A. Metropolitan Region at the Royal Society of Medicine, 1, Wimpole Street, London, W.1. Dinner 7 p.m.; Paper 9 p.m.

General Meeting of the Society of Practising Veterinary Surgeons at the Royal Veterinary College, London, N.W.1, 6.30 p.m.

Winter Meeting of the North of Scotland Division in the Northern Hotel, Aberdeen, 2.30 p.m.

29th (Fri.). Annual General Meeting of the North of Ireland Veterinary Association in the Lecture Hall of the Pharmaceutical Society, 73, University Street, Belfast, 7 p.m.

Meeting of the Yorkshire Veterinary Society at the Royal Station Hotel, York, 2.30 p.m.

February

3rd (Wed.) Meeting of the Southern Counties Veterinary Society at the Royal Hotel, Winchester, 7.30 p.m.

4th (Thurs.). Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, N.W.1, 6 p.m.

5th (Fri.) Annual Ball of the Royal (Dick) School of Veterinary Studies in the Assembly Rooms, George Street, Edinburgh, 9 p.m.

Meeting of the West of Scotland Division at the University Veterinary Hospital, Bearsden Road, Bearsden, 2.30 p.m.

16th (Tues.). Keith Entwistle Memorial Lecture in the Old Library, Pembroke College, Cambridge, 8.15 p.m.

17th (Wed.). Annual General Meeting of the South Eastern Veterinary Association at the Royal Star Hotel, Maidstone, 2.30 p.m.

19th (Fri.). Buffet Dance of the V.V.B.F. at the Talardy Hotel, St. Asaph, North Wales, 8.30 p.m.

24th (Wed.). Annual General Meeting of the Lancashire Veterinary Association in Liverpool, 2.30 p.m.

26th (Fri.). Annual Ball of the Liverpool University Veterinary Society, 8 p.m.-2 a.m.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Berks. Pennyswick Farm, Buscot, Faringdon (Jan. 18).

Dorset. Manor Farm, Stour Provost, Gillingham (Jan. 13).

Lancs. Higher Blundhurst Farm, Mellor, Blackburn (Jan. 14).

Somerset. Ingsdon Farm, Bodden, Shepton Mallet (Jan. 14).

Foot-and-Mouth Disease

Surrey. Perryhill Farm, Worplesdon, Guildford (Jan. 18).

Fowl Pest

Cambs. The Hall, Witcham, Ely (Jan. 12); West Green, Barrington (Jan. 13); 5, Bannold Road, Waterbeach; Hillside Farm, Barrington; 1, Bannold Road, Waterbeach; Hall Farm, Smeeth Road, Emneth, Wisbech (Jan. 16); Bona Lane, Gorefield, Wisbech (Jan. 18).

Essex. 1, Farm Road, Rainham; 2, Farm Road, Rainham (Jan. 14); 76, Lodge Lane, Collier Row, Romford (Jan. 15); Park Farm, Southminster; Mill Hill Farm, Chalk Street, Rettendon Common, Chelmsford; 9, Brockwell Lane, Kelvedon, Colchester; Belle View Poultry Farm, Chalk Street, Rettendon Common, Chelmsford (Jan. 16); Groot Farm, Tolleshunt Major, Tollesbury, Maldon (Jan. 18).

Hants. Croydon Lane, Over Wallop, Stockbridge (Jan. 16); Dene Farm, Nether Wallop, Stockbridge (Jan. 17).

Herts. Hounslowe Field, Donkey Lane, Tring (Jan. 16).

Kent. Sield Bungalow, Headcorn, Ashford; Dodson Farm, Bethersden, Ashford (Jan. 13); Mount Pleasant Farm, Smarden, Ashford; High Bank, Lenham Heath, Maidstone (Jan. 14); Pond Farm, Cocksure Lane, Bunkers Hill, North Cray, Sidcup (Jan. 16).

Lincs. Threeways Poultry Farm, Chapel St. Leonards, Skegness (Jan. 14).

Middlesex. 132, Copper Mill Road, Wraysbury, Staines (Jan. 12); 136, Copper Mill Road, Wraysbury, Staines (Jan. 14).

Norfolk. The Bakery, Market Place, Hingham, Norwich (Jan. 13); Rosary Farm, Banham, Norwich; Hempstead Hall, Hempstead, Holt; Westcroft, London Road, Attleborough; High View, New Costessey, Norwich; Mayfield Farm, Besthorpe, Attleborough; Lodge Farm, Denton, Harleston; 7, Council Houses, Jays Green, Harleston; Staithe Farm, Dilham, North Walsham (Jan. 14); The Oaks, Cantley, Norwich; Poppys Farm, Weybread, Diss; Yew Villa, Horham, Diss; Green Farm, Hales, Norwich; The Hall, Weybread, Diss (Jan. 15); Victoria Farm, Wood Dalling, Norwich; Bure Poultry Farm, Aylsham, Norwich; Malt House Farm, Gissing, Diss; Kellarney Farm, Forncett St. Peter, Norwich; Alpington, Norwich; 4, Honingham, Norwich; Hill Farm, Salhouse, Norwich; 70, The Street, Ingworth, Norwich; Church Farm, and Corner Farm, Weybread, Diss (Jan. 16); Village Farm, Honingham, Norwich; Glebe Farm, Mendham, Harleston; Whitehouse Farm, Tibenham, Norwich; Mundham House, Mundham, Norwich (Jan. 17); The Forge, Tuttington, Norwich; Poplar Farm, Hepworth, Diss (Jan. 18).

Notts. Villa Real Farm, Edwinstowe, Mansfield (Jan. 13); Decoy Farm, Haughton, Retford; Rockley Farm, Rockley, Retford (Jan. 16).

Oxford. Whales Lane, Marsh Gibbon, Bicester (Jan. 14).

Staffs. Beacon Park Farm, Barr Beacon, Walsall (Jan. 16).

Suffolk. Daybreak, Yaxley, Eye (Jan. 12); 54, Bradfield Crescent, Hadleigh; 56, Bradfield Crescent, Hadleigh; 60, Bradfield Crescent, Hadleigh; 58, Bradfield Crescent, Hadleigh (Jan. 14); Moat House, Badwell Ash, Bury St. Edmunds; 69, Station Road, Lakenheath, Brandon (Jan. 16); Manor Farm, Bungay; 2, Station Road, Lakenheath, Brandon (Jan. 18).

Surrey. 276, Woodcote Road, Purley (Jan. 15).

Sussex. No. 2 Holding, Ham Farm, Ham Lane, Ringmer, Lewes; The Oaks, Framfield, Uckfield; Heffle View, Maynards Green, Noram; Pound Farm, Framfield, Uckfield (Jan. 12); Littlewood Experimental Farm, Buxted, Uckfield (Jan. 13); Vetches Farm, Stone Cross, Crowborough; Stonehurst Lane, Five Ashes, Hadlow Down, Uckfield (Jan. 16); Gatehouse, Maresfield, Uckfield (Jan. 17); The Orchard, Rocks Lane, High Hurstwood (Jan. 18).

Yorks. Beechwood, Carlton Miniott, Thirsk (Jan. 15); Swinney Beck Lane, Masham, Ripon (Jan. 17).

Swine Fever

Bucks. Church Farm, Emborton, Olney (Jan. 15).

Cambs. Shrublands, Great Fen Road, Soham, Ely (Jan. 18); The Grange, Terrington St. John, Wisbech (Jan. 18).

Devon. Bishops Farm, Kentisbeare, Cullompton (Jan. 15).

Dorset. Home Farm, Athelhampton, Puddletown, Dorchester (Jan. 18).

Glouces. Fair View Farm, Oakridge Lynch, Stroud (Jan. 18).

Hunts. 26, West Street, St. Ives (Jan. 15).

Lancs. Quakerfields, Off Lambing Clough Lane, Hurst Green, Blackburn (Jan. 18).

Lincs. Thumberley House, Thumberley, Horncastle (Jan. 14).

Oxford. Neithrop Grounds Farm, Neithrop, Banbury (Jan. 14).

Suffolk. Charsfield Hall, Charsfield, Woodbridge; Westmead, Rendham, Saxmundham (Jan. 12); Kenny Hill Farm, Kenny Hill, Mildenhall, Bury St. Edmunds (Jan. 15).

Sussex. The Piggeries, Race Hill, Brighton (Jan. 18).

Warwicks. Pasture Farm, Broad Lane, Tanworth-in-Arden, Solihull (Jan. 14).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

GENERAL

"Progress"

Sir,—Mr. Swift's letter in your issue of January 2nd should be of great interest to all practising members of the profession. He covers a wide field, but that part of his letter which is of more immediate concern to us is the latter half, where he deals with the current "do-it-yourself" attitude to matters pertaining to animal health.

We practise in a large sheep-rearing area, and in support of Mr. Swift we would mention that we have observed a serious increase in the direct distribution and sale of veterinary products by certain firms. In such an area there is often little contact with sheep farmers, and as the supply of vaccines and other products is, in our opinion, far too easily available to the farmer through "veterinary" chemists and salesmen operating from vans, the resulting lack of professional advice often leads to mismanagement and preventable losses. When farmers are encouraged, by the waves of propaganda pouring forth daily from the head offices of wholesale chemists through the national, provincial, and agricultural press, to obtain their veterinary requirements through these channels, such contact as the farmer has with his veterinary surgeon becomes rare indeed. Van salesmen are usually competent drivers but are not qualified to advise or even encourage the sale of one product in preference to another. We believe that the ready availability of drugs by such means is an encouragement to farmers to make their own diagnoses, and positively alienates them from the expert services of the profession. We ourselves have been told by a pharmaceutical representative that "it is in the nature of things, in this 'do-it-yourself' age, that farmers, who are much better 'educated' than they used to be, should be encouraged to be more independent of their veterinary surgeons."

A variety of commercial and semi-professional bodies have easy access to farms. A visit, as such, costs nothing to the farmer, who understandably associates a professional visit with costs. The wholesale or retail chemist is on the spot, and mysteriously the farmer displays a readiness to listen to him and "try" one or other of his expensive products, rather than seek professional advice, a correct diagnosis and the remedy for the disease. The day of reckoning must frequently come when the chemist's visit will have proved costly indeed, in terms not only of drug bills, but in animal losses and even a veterinary surgeon's bill for having carried out a *post-mortem* examination. It would appear that the firms concerned do not recognise their moral obligation to ensure that their products are properly used, *i.e.* by the profession.

This alienation of the farmer from his veterinary surgeon by the indiscriminate sale and use of drugs can be illustrated:—

(a) In a flock of 400, over 70 ewes were lost over a period of 7 months, and the cause allowed to go uninvestigated.

(b) 25 valuable ewes were lost as a result of the farmer having used the wrong anthelmintic, bought from a van.

(c) In a casual encounter, a client complained that his calves were not responding to sulphamethazine, also purchased from a van.

Many similar cases can be cited.

The trading policy of certain drug firms actually favours the supply of their veterinary products to chemists and traders at the expense of the profession. Not only are traders supplied first when stocks are scarce, but frequently better discount rates are given to them. We would here express our appreciation of those firms whose ethical policy has ensured that relations between themselves and the profession will be maintained on a basis of mutual respect, by exercising care that their products are used only as a result of veterinary advice and prescription—and this in face of competition from rival firms. As long as the intensive advertising campaign, which ignores the necessity for correct diagnosis and skilled knowledge, continues, the abuses we have illustrated will prevail. It is indeed an effrontery when a retail chemist is emboldened to advertise a well-known proprietary brand of sulphadimidine in the catalogue of an agricultural society's annual show, and when another displays the same product on his shelves.

The profession will be failing not only itself, but also those who put their trust in us, if it does not take a united and spirited stand against this insidious undermining of the profession's purpose and status within the agricultural community. We are doing our best to combat the trouble in our own area. May we expect the support of our colleagues elsewhere?

Yours faithfully,

Dornoch, Sutherland. *January 7th*, 1960.

W. W. ROBERTSON,
G. MACLEOD.

Travelling Assistants

Sir,—For some time I have been pondering the problem of locums for holiday periods. One of the main difficulties is the fact that if one employs, as is often necessary, a different locum for each holiday period, it entails various persons familiarising themselves with the district—not an easy matter in most parts of London. There is also the question of expense which can be quite heavy when employing someone for single short periods. Furthermore, it is often difficult to obtain a locum when required.

It has occurred to me that there may be the

possibility of a group of veterinary surgeons employing their own full-time "circulating assistant" in the London area, which would mean that their vacations could be suitably arranged beforehand and the circulating assistant would soon become familiar with the working of the various practices where he would act as locum. This would also have the added advantage, from the clients' point of view, of not meeting a stranger on each occasion when the principal and/or his assistant or assistants were away. If there are any principals finding themselves in my position and would like to investigate this "group" idea, perhaps they would care to contact me. Tentatively, I feel that 8 to 12 members, including myself, would be a suitable number to participate in this scheme.

I could myself employ a locum for at least 2 months a year, which would not include the ever-popular June, July, and August, and I am quite certain that some other members, as well as my two assistants, could well utilise an extra vacation if all the locum's time was not fully engaged.

I do realise that there would need to be lengthy discussions before amicable arrangements could be reached, but I would like to have the views of other principals on this idea and would also be interested in the view point of possible employees.

Yours faithfully,
RAYMOND H. HOLMES.

The Green,
Totteridge,
London, N.20.
January 14th, 1960.

Cardiovascular Disease in Cats and Dogs

Sir,—May I compliment Miss Joshua on her excellent article on cardiovascular disease in dogs and cats.

The paragraph on "Heart Murmurs" interests me as I have encountered 2 cases in dogs with the same clearly audible whistle, and I would suggest that in fact lubrication would be the answer if it were possible, as the cause of the whistle in these cases would appear to be due to air in the mediastinum and not a true heart lesion. The cases referred to cleared up spontaneously in 4 to 6 weeks and it was then possible to confirm by auscultation that the heart sounds were normal.

I can find no explanation as to why or how the condition arises, but I believe that it is well recognised in man.

Yours faithfully,
PETER J. DALTON.

Old Sarum House,
Stratford Road,
Salisbury.
January 18th, 1960.

SCIENTIFIC

Griseofulvin in the Treatment of *Microsporum canis* Infection in Dogs

Sir,—Gentles (1958) has shown that oral griseofulvin can control experimental skin infections by *Trichophyton mentagrophytes* or *Microsporum canis* in guinea-pigs. Several reports have since been published mainly on use of this antibiotic in the treatment of various fungal skin infections in man. Lauder and O'Sullivan (1958) reported on the use of griseofulvin in the treatment of calves artificially infected with *Trichophyton verrucosum*.

We wish to report the successful use of griseofulvin* for treating spontaneous *M. canis* infection in dogs.

When 4 Boxer puppies, of the same litter, showing extensive lesions, were examined with a Wood's lamp, numerous fluorescent hairs on the affected areas could be seen. Cultural examination revealed infection with *M. canis*. It was decided to treat 3 of the animals with griseofulvin and leave the fourth untreated. Each puppy, weighing approximately 10 kg., received a daily dose of 250 mg. by mouth.

Griseofulvin given orally is taken up by the keratin-producing cells. The effect is such that the new keratin produced is resistant to invasion by certain pathogenic fungi. As new hair grows it is free from infection, although the already affected part of the hair still shows the presence of living fungus. As the lesions were extensive, it was decided that clipping could not be undertaken successfully; the puppies were shedding their coats and this natural process was used to eliminate infected hairs.

Two weeks after treatment began, the lesions of the 3 treated puppies were covered by a growth of new hair, and considerable reduction of inflammation was noted. The control puppy showed no improvement. Fluorescent hairs were still present in all 4. Treatment of the control was then begun with doses similar to those given to the other 3.

Twenty-eight days after beginning griseofulvin therapy, treatment of all puppies was stopped. The sites of the original lesions were completely covered with hair and were difficult to distinguish from the normal skin. On examination with a Wood's lamp only a few fluorescent hairs could be detected. Two weeks later no fluorescence was noted, and cultural examination of the hairs from the original infected areas were negative for *M. canis*.

This trial indicates that griseofulvin at approximately 25 mg. per kg. given daily can eliminate extensive infection with *M. canis*.

The antibiotic was well tolerated; further, its ease of administration for an extensive infection compared favourably to that of applying topical medicaments, some of which may be toxic when applied to widespread lesions.

Yours faithfully,
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References

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* Grisovin, Glaxo.